

HYPERBOOK AND STUDENT CRITICAL THINKING***Fajar Arianto, Irena Yolanita Maureen and Anisa'ul Indah Mutiasari**

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Abstract

Critical thinking is a skill needed in the 21st century. In the learning process must develop the ability to think critically. Teaching materials used in lectures facilitate students' critical thinking. This study aims to determine the impact of using hyperbooks on students' critical thinking. Participants in this study amounted to 25 students. The research method used is a weak experiment by comparing the results of the pre-test and post-test. The results showed that there was an increase in students' critical thinking. Utilization of hyperbooks can improve students' reading comprehension skills which leads to students' critical thinking.

Keywords: Hyperbook, Critical thinking, Metacognitive strategy, Reading comprehension.

INTRODUCTION

The ability to think critically in students is the main goal of higher education (Bahr, 2010). The consensus on the goals of education in the 21st century focuses on the importance of critical thinking and requires awareness to integrate into subjects (Dumitru *et al.*, 2018). The curriculum and various policies have underlined the importance of developing critical thinking, but it is still not going well and emphasizes memorization, and passive transfer of knowledge (DiCarlo, 2009 in Dumitru *et al.*, 2018). In the digital era, the process of learning in higher education is very important to improve students' critical thinking in each subject. Kergel, Heidkamp, Telléus, Rachwal and Nowakowski (2018) explain the approaches used in integrating critical thinking in courses, namely infusion, immersion, general, and mixed. The infusion approach includes critical thinking directly on lecture material so that students can directly gain a better and deeper understanding. The immersion approach, the learning design prepared by the lecturer is directed to provoke cognitive activity aimed at critical thinking. The general approach, critical thinking is not included in the course, but is taught separately in a particular course. A mixed approach, namely combining the three approaches associated with learning in the classroom, with different formats associated with learning in normal classes, such as in seminars. Critical thinking in the learning process requires supporting teaching materials that can activate cognitive processes. Teaching materials that connect with mobile technology devices are related to learning motivation (Krnél and Bajd, 2009). Online learning resources can help develop students' critical thinking skills in a sustainable manner (Armichael and Farrell, 2012). Students do not have time and place limitations in utilizing teaching materials online (Wang and Hsu, 2006). The use of teaching materials online can activate all five senses of students when they are studying (Denić and Nešić, 2022). Students in the learning process by utilizing various sources can foster their curiosity with learning resources that are available openly. The use of hyperbook teaching materials, where students can directly

access the resources available online will be able to activate their cognitive abilities. Hyperbook is a grouping of electronic texts into one unit (Fröhlich, Henze, and Nejd, 1988). The content of a hyperbook consists of document fragments linked to one or more concepts (FALQUET and ZISWILER, 2003). There are 4 common types of links, namely examples, examples, illustrations; definitions; properties; and references. An instance, example, illustration is a fragment that describes a particular example of the intended concept. Definitions are fragments that explain concepts textually. A property describes the properties of the concept. Reference, usage is a fragment that menace the concept.

METHODS

The method used in this study was a weak experiment in one group that was treated and then observed the effect of the treatment given. Participants in this study amounted to 25 students in the first semester. Participants were treated by using a hyperbook for one semester. Participants are given an essay test which is one way to evaluate critical thinking (Ennis, 1993). The essay test used in this study is to analyze scientific articles. Other assessment indicators used are (1) statement clarity; (2) accuracy in giving statements; (3) relevance to the question; (4) precision, namely answers must be precise and accurate; (5) the depth of the answer according to the study of the theory or appropriate evidence; and (6) breadth in giving reasoning (Paul and Elde, 2019). The results of student answers are assessed based on the six indicators using a scale of 1-4. The analysis technique in the research was carried out by comparing the results of the pre-test with the post-test

RESULTS AND DISCUSSION

The results of the normality test in table 1 show normal data with a p-value <0.05 for the pre-test and post-test. Table 2 shows that the data is homogeneous with $p = 0.882 (> 0.05)$. The research data is normal and homogeneous, the data is calculated using the Paired Samples Test by comparing the scores of the pre-test with the post-test. Table 3 shows a pre-test mean of 12.84 and a post-test mean of 20.08 which indicates an increase in critical thinking. Table 4, shows sig.

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0.000 (<0.05) which can be concluded that there is an increase in students' critical thinking after using the hyperbook.

Table 1. One-Sample Kolmogorov-Smirnov Test

		Pre test	Posttest
N		25	25
Normal Parameters ^{a,b}	Mean	12.84	20.08
	Std. Deviation	1.214	1.256
	Absolute	.232	.208
Most Extreme Differences	Positive	.168	.152
	Negative	-.232	-.208
Test Statistic		.232	.208
Asymp. Sig. (2-tailed)		.001 ^c	.007 ^c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Table 2. Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
.022	1	48	.882

Table 3. Paired Samples Statistics

	Pair 1	
	Pre test	Posttest
Mean	12.84	20.08
N	25	25
Std. Deviation	1.214	1.256
Std. Error Mean	.243	.251

Table 4. Paired Samples Test

		Pair 1
		Pre test - Posttest
Paired Differences	Mean	-7.240
	Std. Deviation	1.640
	Std. Error Mean	.328
	95% Confidence Interval of the Difference	Lower -7.917
		Upper -6.563
t		-22.072
df		24
Sig. (2-tailed)		.000

The use of various connected texts as learning resources makes students the capacity to think critically based on their experience (Rajakannan and S, 2021). Students develop digital literacy when they search, explore various sources, gather information, and evaluate (Faria and Gattolin, 2018). In learning activities, the use of hyperbooks makes students actively carry out reading and writing activities related to the material being studied. Students read comprehension related to their metacognitive. Research (Memiş and Kandemir, 2019) shows that metacognitive reading comprehension can improve students' abilities in learning achievement, and can determine when, where, and how to transfer skills related to high reading performance and comprehension. The use of open learning resources, where students carry out comprehension from reading by activating metacognitively related to self-regulation (Nash-Ditzel, 2010). The use of hyperbooks promotes self-regulation in students, where they will have self-awareness, resources, and self-confidence (Ellis and Zimmerman, 2002). The affordability of technology in hyperbooks makes it easier for students to apply several pedagogical approaches and encourage critical thinking. (Garza *et al.*, 2019). Learning with hyperbooks encourages students to develop digital literacy skills to think creatively, analyze, synthesize, practice, research, evaluate and reflect through critical thinking

(Kaeophanuek *et al.*, 2019). Students with hyperbooks encourage their ability to use various information formats that emphasize critical thinking (Spante *et al.*, 2018). Reading comprehension is an active and constructive meaning-making in which the reader plays a central role, which combines rapidly changing information representations that demand broader knowledge (Coiro, 2011). Research by Zenotz (2012) shows that by reading through online texts that are linear and non-linear, students use metacognitive strategies to increase understanding. Clinton (2019) emphasized that good readers go through a metacognitive process in how much awareness in understanding texts is associated with positive reading performance. Online reading requires skills and strategies, (1) reading to identify important questions, (2) reading to find information, (3) reading to critically evaluate information, (4) reading to synthesize information, and (5) reading and writing to communicate information (Leu *et al.*, 2014).

Conclusion

The ability to think critically in higher education is a goal that must be developed and improved. Teaching materials developed must be able to facilitate critical thinking. Hyperbook is a teaching material that can connect teaching materials with materials available online. Resources available online, students can explore understanding in reading critically. Providing online learning resources through hyperbooks, students enrich their reading resources by going through their cognitive processes and strategies to support critical thinking.

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